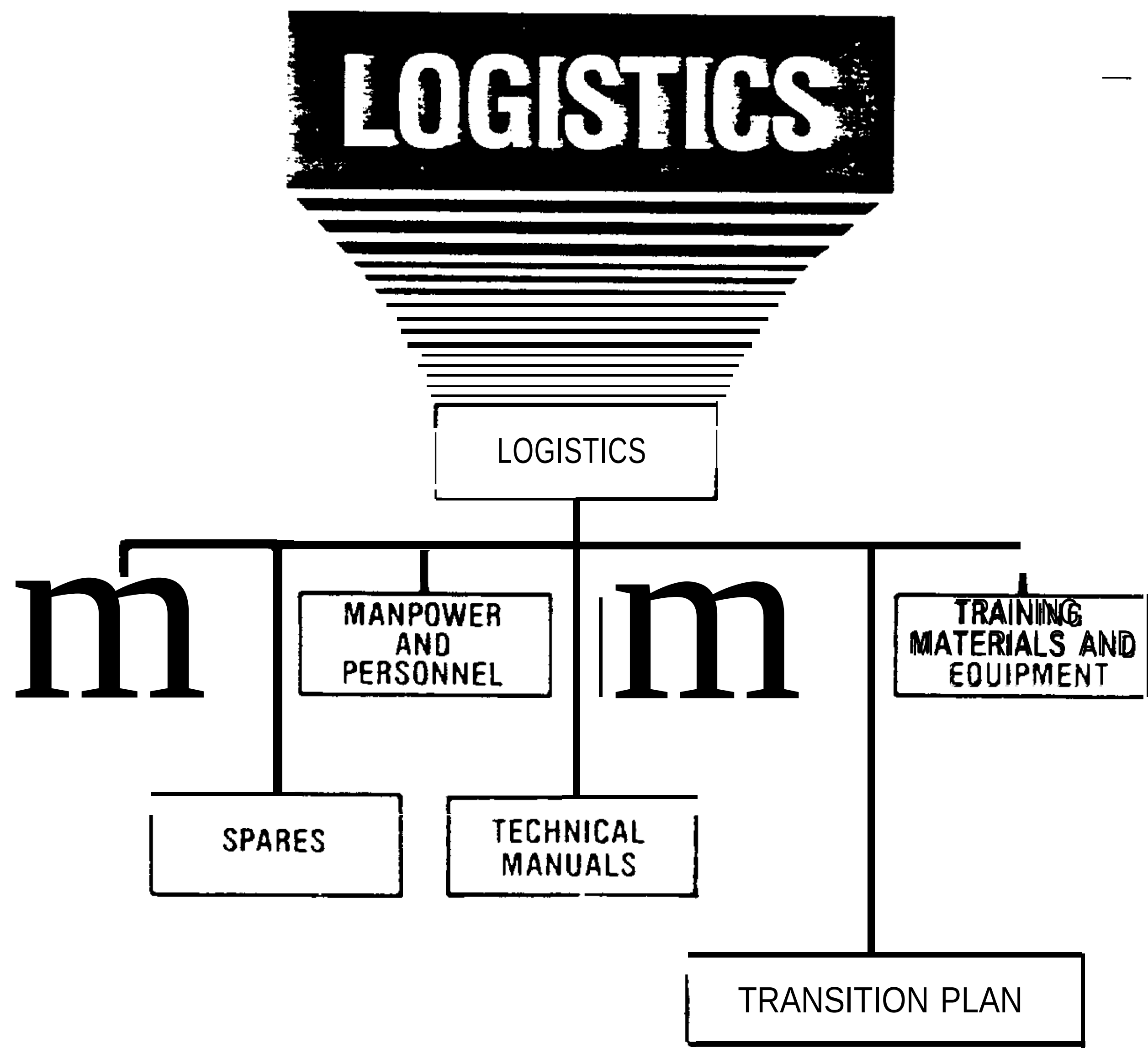


LOGISTICS
LOGISTICS
MANPOWER AND PERSONNEL
TRAINING MATERIALS AND EQUIPMENT
SPARES
TECHNICAL MANUALS
TRANSITION PLAN

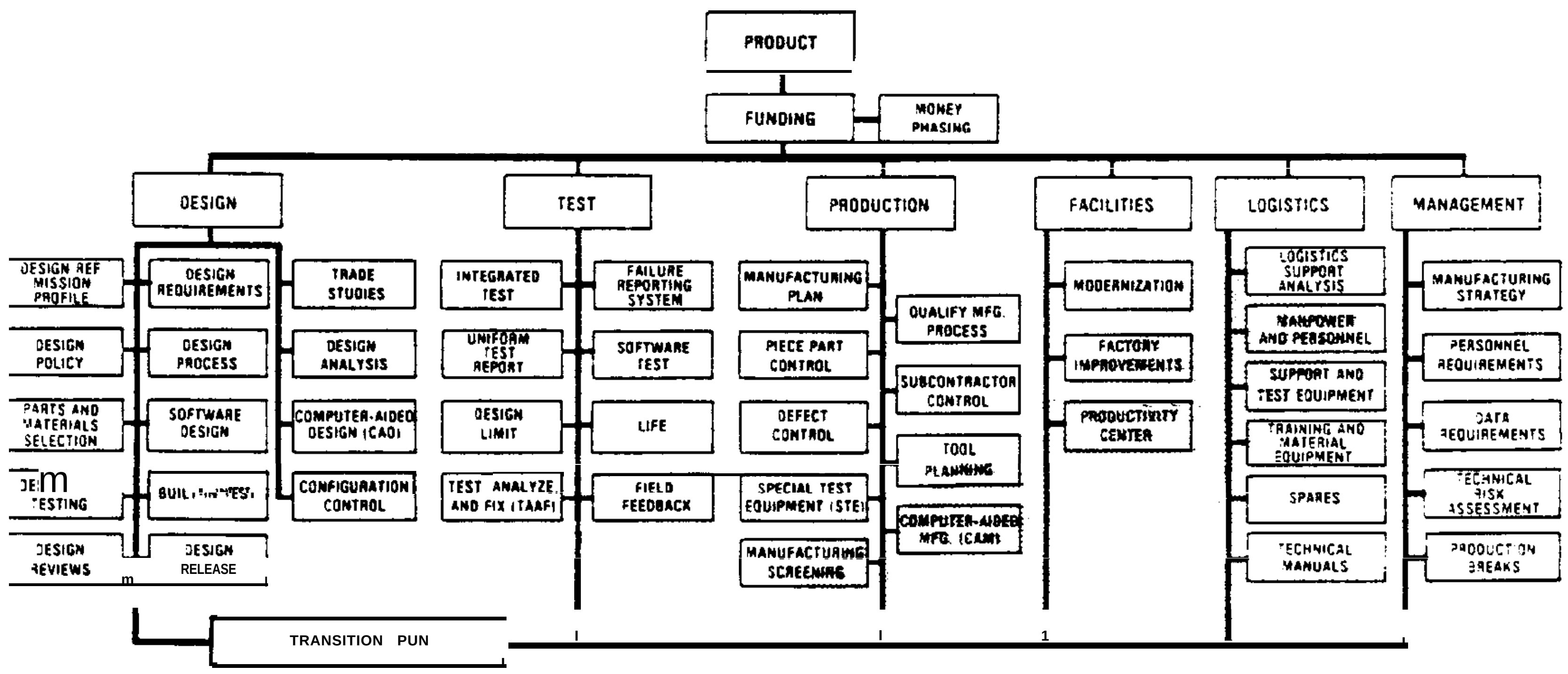
CHAPTER 8

INTRODUCTION FOR LOGISTICS CRITICAL PATH TEMPLATES

The primary purpose of the acquisition process is to field weapon systems and equipment that not only perform their intended functions, but are ready to perform these functions when called on, and to do so over and over again without unplanned maintenance and logistics efforts. However, numerous examples abound when new systems, when fielded, do not achieve readiness levels to meet service needs, necessitating engineering and manufacturing changes as well as additional equipment, spares, and maintenance resources, all of which increase cost as well as production and deployment risk.

The templates in this section address logistics and supportability issues that contribute to the risk of transition from development to production. Accordingly, they do not explicitly refer to all integrated logistics support (ILS) elements or outline a total strategy for I LS planning and management in the acquisition process. These elements and strategy are covered in DoD Directive 5000.39 (reference (k)) and Military Service implementing documents. As specified in reference (k), the acquisition manager is required to develop an ILS plan that successfully coordinates the areas addressed in this logistics section. The logistics elements and supportability issues and their requirements, outlined in this section, represent those that have been particularly difficult and destabilizing, and require special attention. Therefore, the implementation of the concepts, procedures, and techniques discussed in this section will reduce significantly the risk of transition from development to production and deployment.

TEMPLATE



LOGISTICS SUPPORT ANALYSIS

AREA OF RISK

Logistics Support Analysis (LSA) is used throughout the acquisition process to evaluate design approaches and alternative support concepts to achieve system readiness and support objectives, and to develop detailed design of the support system and requirements. Weapon system programs that have either delayed the application of LSA or have not integrated it effectively into the design analysis process are headed for trouble. The result is supportability deficiencies that increase costs and require additional engineering changes to correct these deficiencies late in the development and production process.

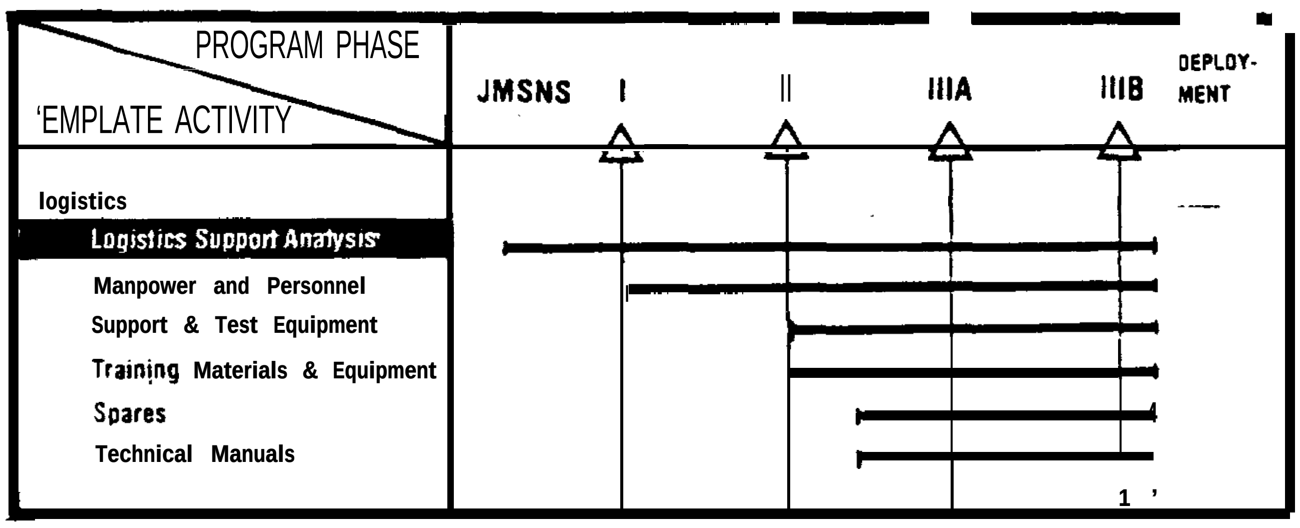
OUTLINE FOR REDUCING RISK

- Design objectives and development of design options to achieve readiness and supportability objectives are required by the engineering statement of work (SOW).
- LSA is integrated into the design process to determine design impact on support.
- The LSA process has identified high leverage subsystem and component reliability and maintainability efforts needed to achieve readiness and deployment objectives.
- Quantitative logistics and supportability requirements are given explicit weight in source selection.
- LSA data is derived from the same source data used by design and test engineering.
- The engineering disciplines have an “agreed to” methodology for quantifying readiness and supportability design impacts.

- Disposition of LSA-identified cost and performance drivers are coordinated with the users to permit meaningful tradeoffs.

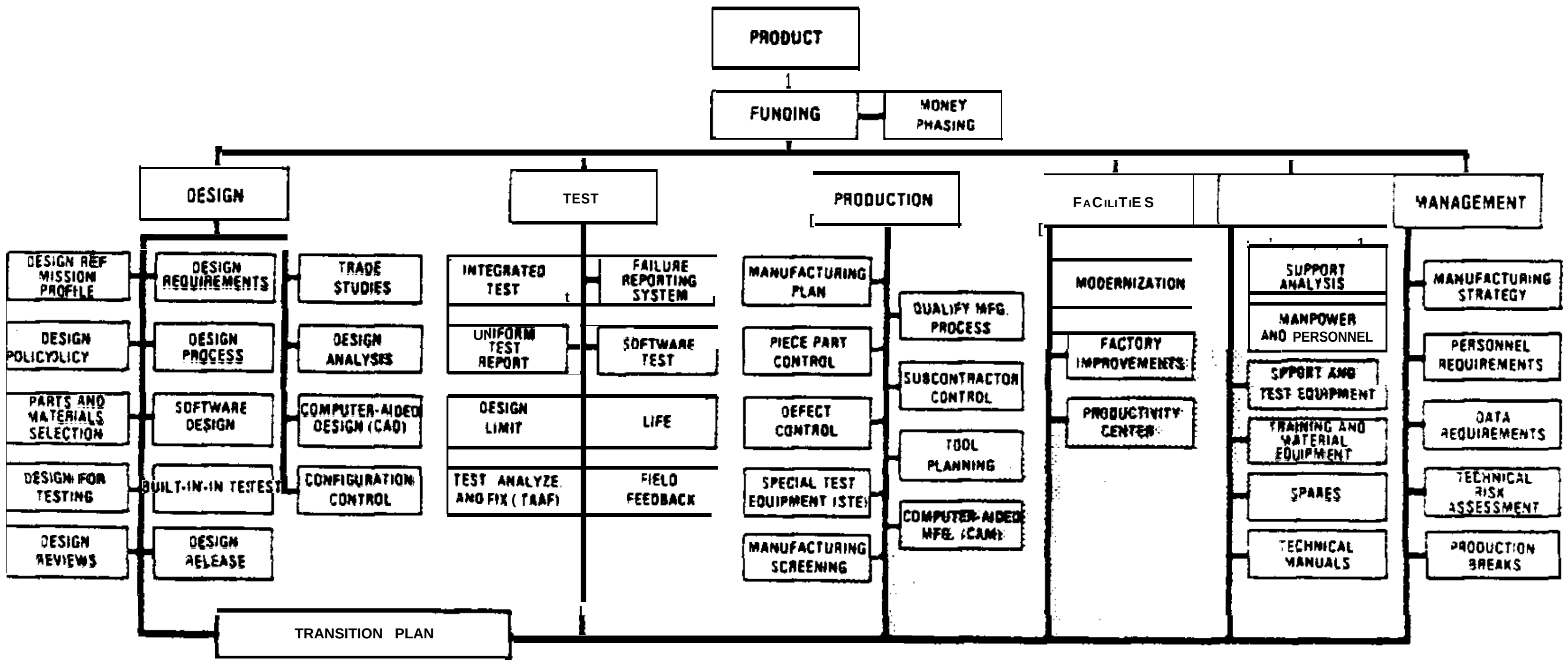
- Adequate funding and technical manpower are programed to perform LSA analyses required during the concept demonstration and validation phase and followup.

TIMELINE



The LSA is begun early in the development process to explicitly address supportability and support requirements throughout the design, development, and production process.

TEMPLATE



MANPOWER AND PERSONNEL

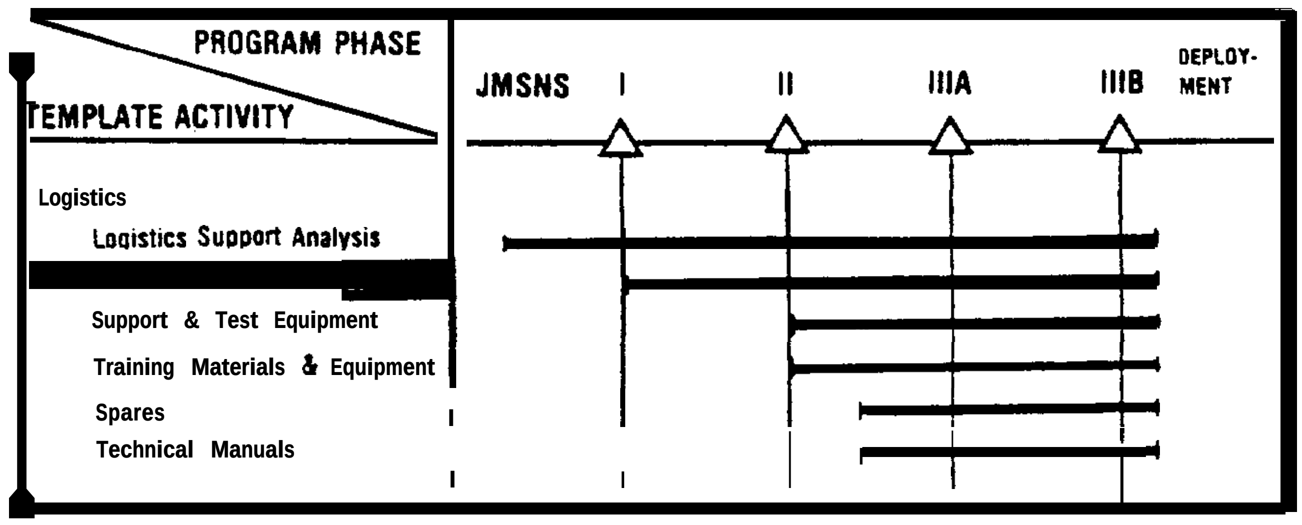
AREA OF RISK

Weapon systems and support systems must be designed with as complete an understanding as possible of user manpower and personnel skill profiles. A mismatch yields reduced field reliability, increased equipment training, technical manual costs, and redesign as problems in these areas are discovered during demonstration tests and early fielding. Discovery of increased skill and training requirements late in the acquisition process creates a difficult catchup problem and often leads to poor system performance.

OUTLINE FOR REDUCING RISK

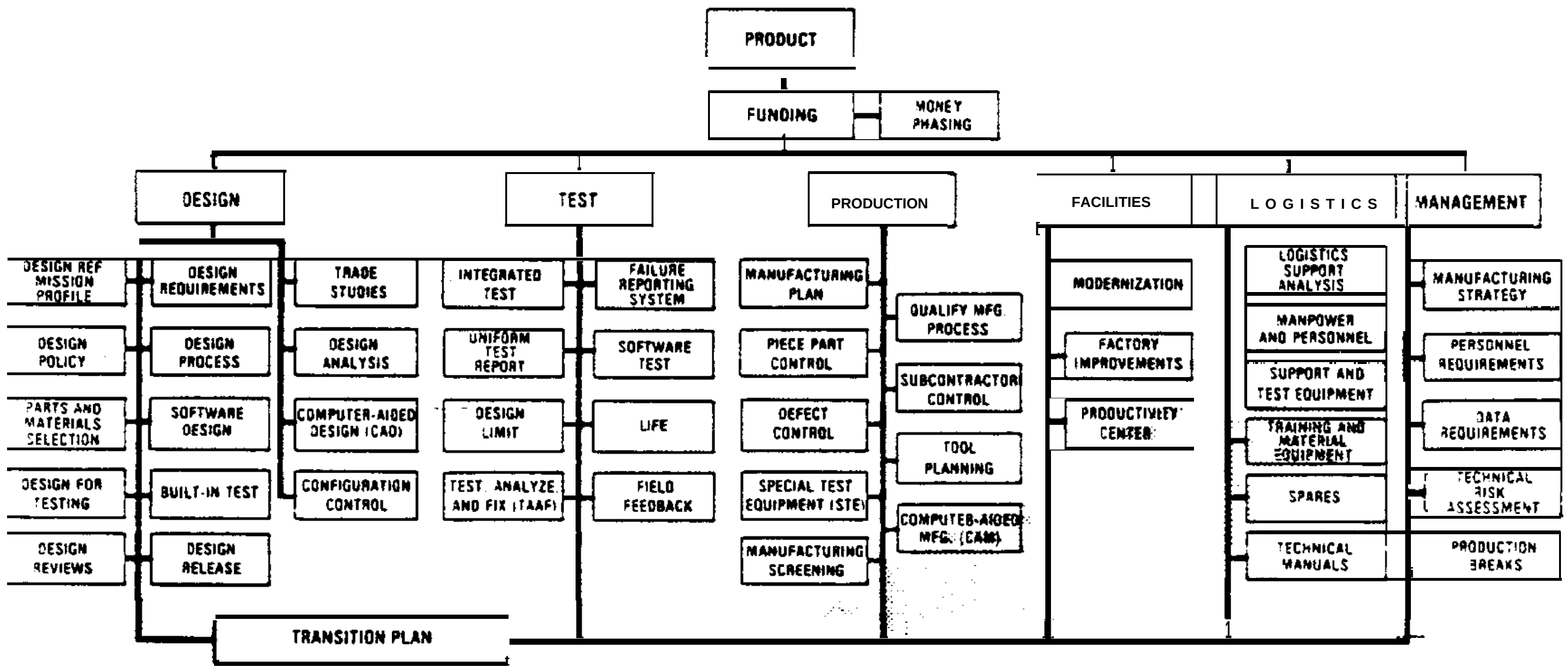
- Manpower and skill requirements are based on formal analysis of previous experience on comparable systems and maintenance concepts. This is done under contract during the preconceptual through validation phase.
- RFPs reflect the required priority for reducing manpower quantities or skill requirements. This is backed up by detailed descriptions of current and projected manpower skill resources and shortfalls. This data includes specific information on current maintenance and operator performance and realistic manpower costs on similar fielded systems.
- Arrangements are made for the contractor to observe maintenance in the field to gain appreciation for capabilities and constraints.
- Manpower cost factors used in design and support tradeoff analyses take into account costs to train or replace experienced personnel, as well as billet and true overhead costs.

TIMELINE



Manpower and skill requirements are established early in the conceptual phase and are considered as prime design considerations during development. They are addressed specifically during LSA, and tradeoffs in design are made to minimize their requirements.

TEMPLATE



SUPPORT AND TEST EQUIPMENT

AREA OF RISK

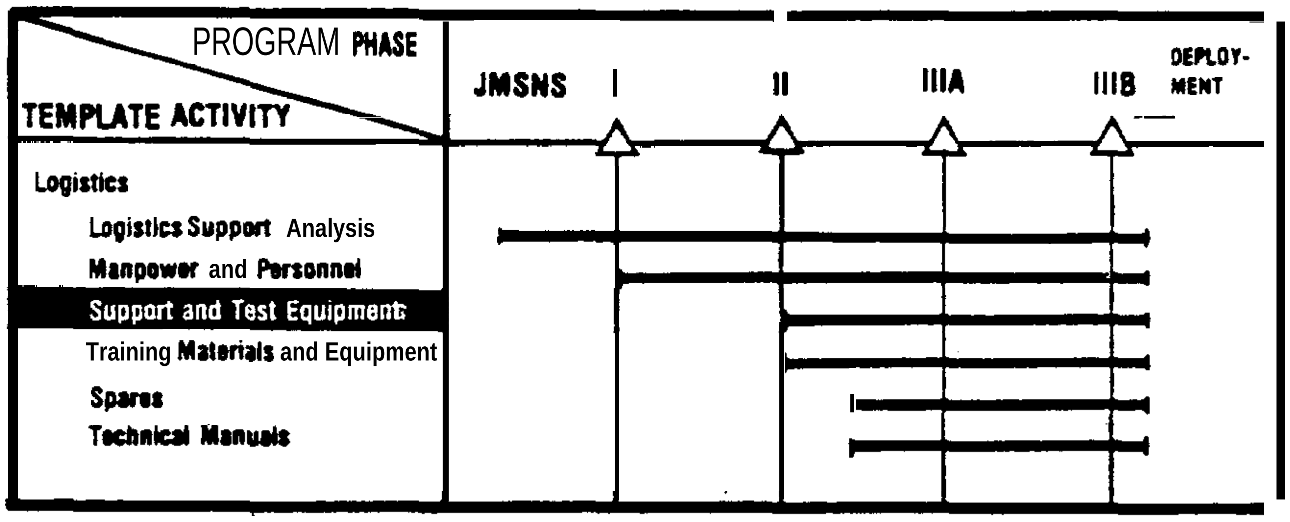
Weapon system supportability is dependent on reliable and maintainable support and test equipment that can be deployed with the prime system. However, the development, production, and fielding of this equipment have been a common source of risks in terms of increased costs, schedule delays, and poor performance and readiness for fielded systems. The more significant causes of this risk are: (1) delayed identification of support equipment requirements; (2) design and development of software intensive support equipment before design stability of the system it supports; (3) underestimation of software requirements and development costs; and (4) failure to apply sound engineering, manufacturing, and management disciplines to the design, development, test, and production of support and test equipment.

OUTLINE FOR REDUCING RISK

- Identification of support equipment needs, as part of the LSA process, is initiated as early in development as prime system concept permits.
- Test equipment performance specifications include criteria for fault detection, isolation, and false indications.
- Phased contractor support is utilized to allow for design instability.
- Test equipment performance, procedures, and software verification and validation are completed before contractor support termination.
- Upward compatibility is specified between BIT and intermediate, depot, and factory -levels of support equipment.

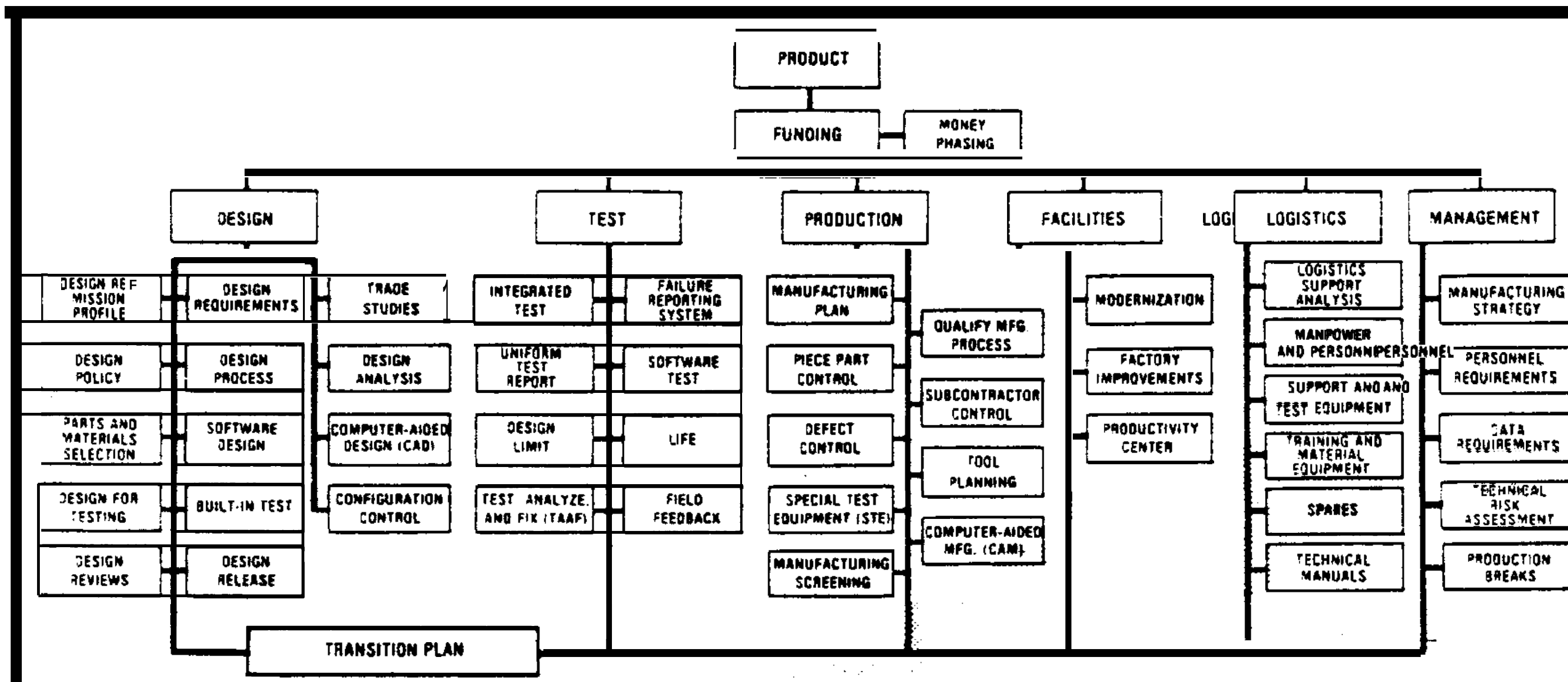
- Support and calibration requirements for test equipment are included in development and production contracts.
- Estimated costs of test program set (TPS) development are based on comparable equipment development and are funded fully.
- Support and test equipment is evaluated during formal contractor maintainability demonstrations and "in" operational tests.

TIMELINE



Support and test equipment design, test, production, and supportability follow the same processes outlined in this Manual for the prime equipment.

TEMPLATE



TRAINING MATERIALS AND EQUIPMENT

AREA OF RISK

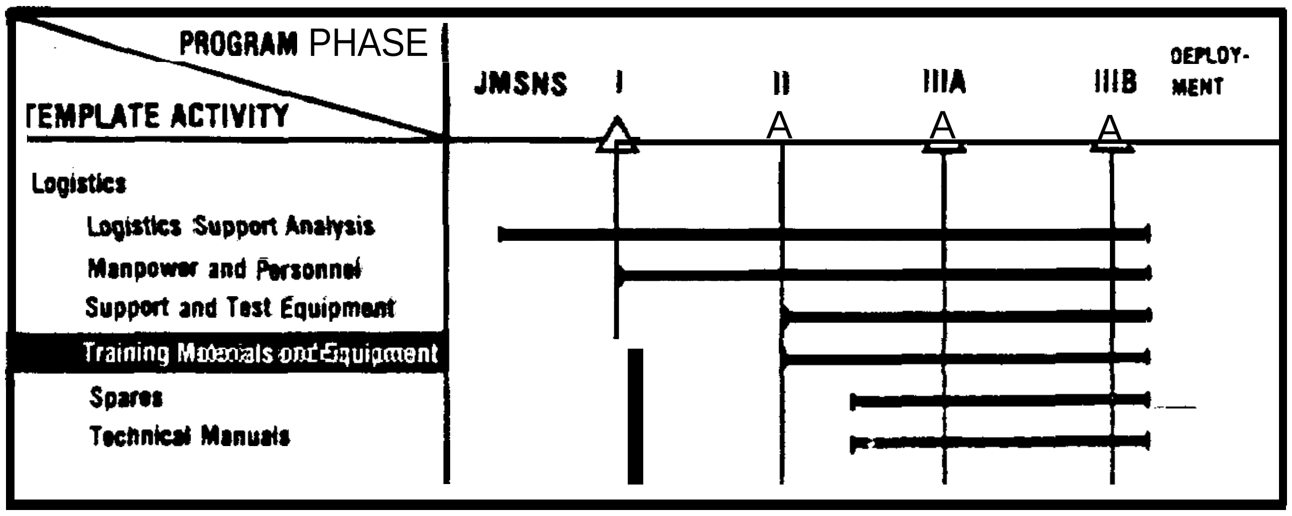
On some programs, training requirements are not addressed adequately, resulting in great difficulty in operation and support of the hardware. Training programs, materials, and equipment such as simulators may be more complex and costly than the hardware they support. Delivery of effective training materials and equipment depends on the understanding of final production design configuration, maintenance concepts, and skill levels of personnel to be trained. On many programs, training materials and equipment delivery schedules are overly ambitious. The results include poor training, inaccuracies in technical content of materials, and costly redesign and modification of training equipment.

OUTLINE FOR REDUCING RISK

- Contractors are provided with clear descriptions of user personnel qualifications and current training programs of comparable systems, to be used in prime hardware and training systems design and development.
- Maintenance tasks identified through LSA provide the data base used in comprehensive training program development systems (such as instructional systems development (ISD)).
- Computer-aided techniques are used for configuration control to ensure consistency between training materials and equipment and the systems they support.
- On-the-job training capability is incorporated in the prime equipment design as a method to reduce the need for additional training equipment.

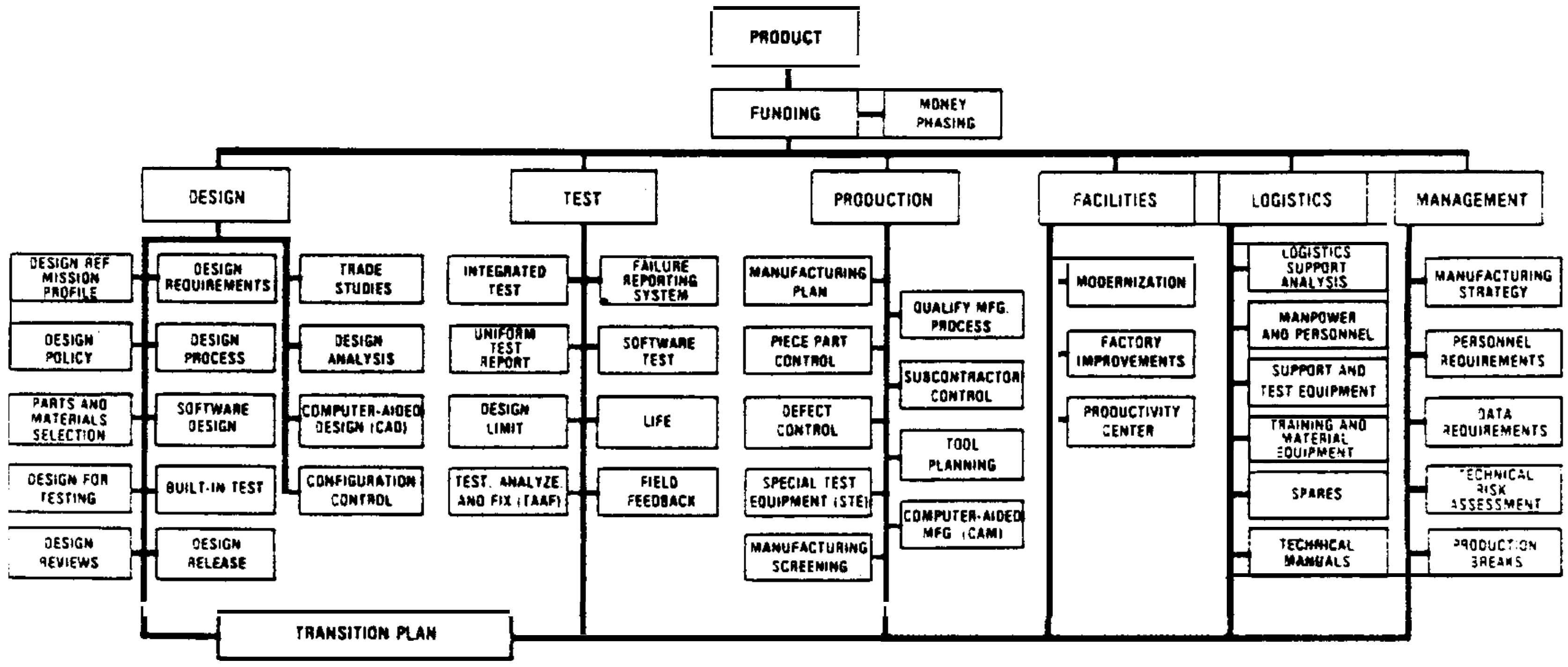
- Complex and costly training equipment, such as simulators, is scheduled to be produced after design freeze of the prime equipment.

TIMELINE



Training materials and equipment must match maintenance plans. Equipment built-in training features must be established early in the design phase, and the training device design must reflect stable prime equipment design.

TEMPLATE



SPARES

AREA OF RISK

Spares are a troublesome area in the production and deployment of weapon systems. Spares and repair parts often do not meet the same quality and reliability levels as the prime hardware. Full spares provisioning too early in the development cycle, when there are large uncertainties in the predicted failure rates and design stability, results in the procurement of unneeded or unusable spares. inadequate technical and reprocurement data frequently limits competition, acquisition flexibility, and spares manufacturing throughout the iife cycle of the prime systems. Spares thus present a major risk of increased acquisition and support costs and reduced readiness of fielded systems.

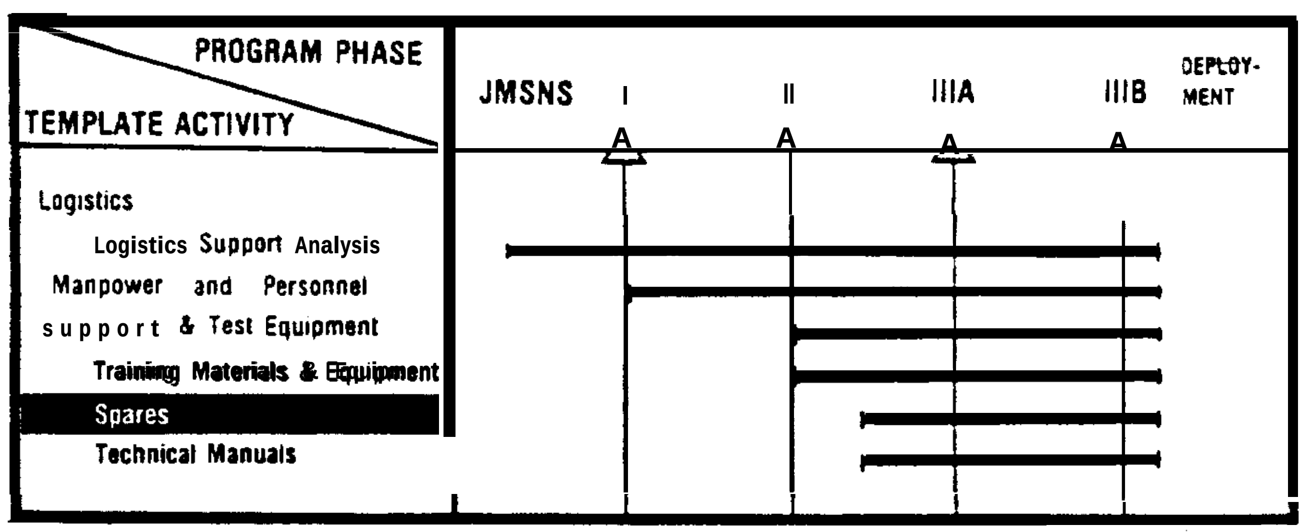
OUTLINE FOR REDUCING RISK

- A spares acquisition strategy is developed early in FSD to identify ieast cost options, including combining spares procurement with production. This strategy addresses spares requirements to meet FSD testing as weii as production and deployment.
- The same quality manufacturing standards and risk reduction techniques used for the prime hardware are used in the spares manufacturing and repair process.
- Transition from contractor to Government spares support is planned on a phased subsystem-by-subsystem basis.
- Initial spares demand factors are based on conservative engineering reliability estimates of failure rates (derived from comparability analysis) and sparing to availability analytical models. These factors are checked for reasonabieness at the system or major subsystem level against laboratory and field test results and documented in the logistics support analysis data base.

. Technical and reprocurement data is validated by analysis and, when possible, by "proof models," to ensure the quality of the spares and repair parts production process.

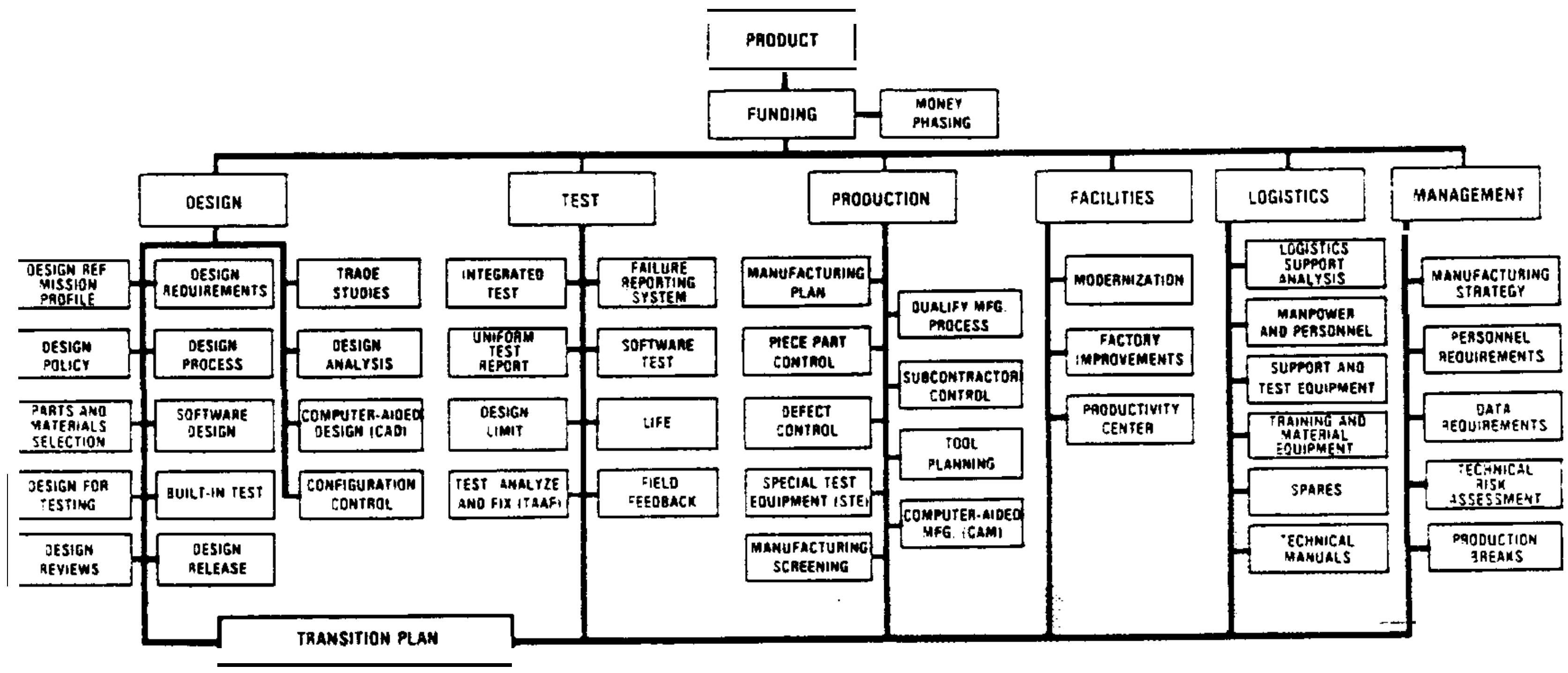
- **Plans for developing spares procurement and manufacturing options to sustain** the system **until phaseout are considered in the production decision.** These plans include responsibilities and funding for configuration management, engineering support, supplier identification, and configuration updates of factory test equipment to the current fielded configuration of the produced item.

TIMELINE



Key factors in the risk equation are operational utilization, spares provisioning, design stability, adequacy of technical and reprocurement data, and quality of spares manufacturing and repair process.

TEMPLATE



TECHNICAL MANUALS

AREA OF RISK

Technical manuals frequently do not match the production configuration of the equipment supported. The manuals are difficult to read and understand. These deficiencies cause delays in operational testing, low readiness rates, increased revisions change activity, and increased spares and data costs.

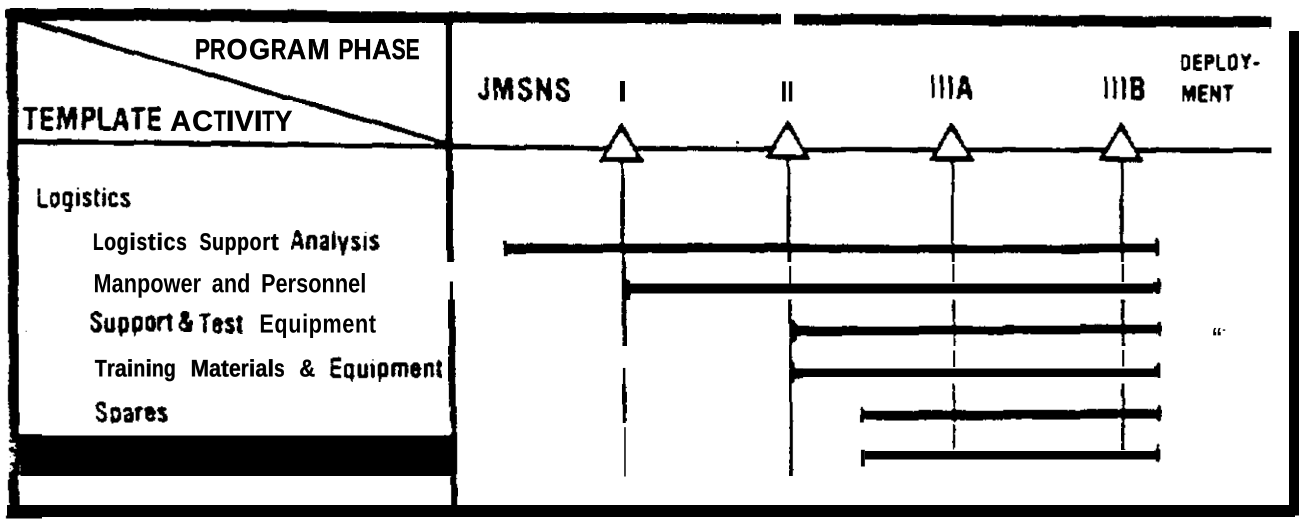
OUTLINE FOR REDUCING RISK

- A clear delineation of Government and contractor responsibilities in the development, verification, validation, and publication of technical manuals is outlined in the ILS plan.
- Automated processes (such as the use of computer-aided engineering drawings as illustrations) are used in technical manual preparation. These processes are encouraged by RFP requirements and evaluations during source selection.
- The LSA process analyzes technical options for portraying information including embedded and paperless delivery.
- Maintenance tasks identified through the LSA process provide the data base used in technical manual development.
- Draft manuals are validated and verified before final preparation and publication. Equipment availability to be used in verification and validation is specified in the contract.

- Automated readability analyses are used to verify that the level of the document matches the level specified.

- The milestone schedule includes interim manuals for initial training.

TIMELINE



The development of technical manuals must be keyed to support of training requirements, engineering development models, equipment evaluation, initial production units, and update programs.

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